

WOOD (H.C.) & DERCUM, (F.X.)

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# SPINAL DISEASES

— WITH AUTOPSIES.

REPORTED BY PROF. H. C. WOOD, AND DR. F. X.  
DERCUM.



REPRINT  
FROM THERAPEUTIC GAZETTE,  
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*CASES OF SPINAL DISEASES, WITH  
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REPORTED BY PROF. H. C. WOOD,\* AND DR. F. X.  
DERCUM.†

THE following cases of organic disease of the spinal cord have seemed to us worthy of being put upon record on account of the diagnostic and pathological interest which attaches to them. It is perhaps proper to state that the microscopic preparations were made by Dr. Dercum, but that the study of these preparations has been carried out conjointly, and that we are equally responsible for their accuracy.

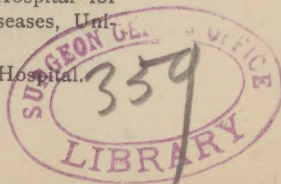
CASE I.—IRREGULARLY DISSEMINATED SCLEROSIS OF THE SPINAL CORD WITH PREDOMINANCE OF DISEASE IN THE LATERAL COLUMNS.

E. B., aged 31, a native of Switzerland, entered the Philadelphia Hospital October 7, 1881. He gave the following history: He was a baker by trade; he had contracted gonorrhœa in 1870, but denied syphilitic infection. In 1878 his legs began to fail in

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power, with a distinct feeling of weakness in the muscles. After some months he had sensations as though a tight cord was drawn around around each leg in the neighborhood of the knee. These symptoms gradually increased. He affirmed positively that he had never had any pains or cramps, or startings of the legs at night.

Upon entering the ward his condition was as follows: Apparently in good health; well nourished and free from all evidences of disease save in his legs. Legs well shaped, muscles large and very firm. The ham string and heel tendons rigidly tight. When sitting he was unable to cross his legs without the aid of his hands, but could extend the leg out almost to horizontal line; when, however, the leg was completely elevated by the hand and stretched out, it remained so for a considerable time and much force was required to flex it back to the normal sitting posture. It was found almost impossible to flex the foot on account of the gastrocnemius contraction, but no distinct ankle clonus could be developed. The patella reflexes were greatly exaggerated; the cremaster reflexes weak. The æsthesiometer points were separated by the legs and feet at two inches; the muscles responded well to faradic currents.

The patient was able to rise from the chair easily but tremblingly, and could only walk by means of a stick, and taking very short steps. He was treated with tonics, alteratives and the actual cautery; and left the hospital after some months improved.

*December 27th, 1883*, E. B. re-entered the ward suffering from pulmonic hæmorrhage. When he was in bed his legs and feet were rigidly extended in close contact and adducted so that the toes crowded one another. Great force was required to flex the leg but no pain was produced. When the leg was raised so that the knee was eight inches from the bed ten seconds were required for it to fall to its normal position. The patella reflexes were greatly exaggerated. The æsthesiometer points were separated on top of the feet at  $1\frac{1}{2}$  inches. There were no contractions other than those noted. He could usually stand alone but the head and body were thrown greatly forward. Most of the time the rigidity of the legs entirely prevented walking. When he walked he did so with the head and trunk bent far forward and kept from falling by two canes put well forward and with their ends widely apart. Raising the heel first from the ground, swinging his body and raising his pelvis, by an effort he got the toes loose from the ground so that he could push or slide the feet forward; the step being only from three to seven inches in length. During walking he did not tremble, but he said that he trembled when he was cold. There was no palsy of the bladder, but when the desire was felt he had to relieve himself at once. No pain or symptoms other than those detailed were present save such as were connected with his lungs.

The nervous symptoms in this case did not



change, and the man died March 12th of acute pulmonary consumption.

#### AUTOPSY.

*Cervical Cord.*—Dense masses of sclerosed tissue were found occupying to a greater or less extent the position of the lateral columns. In the middle portion of the cervical enlargement the sections showed the lateral column of the left side to be *entirely* replaced by connective tissue, though upon the right side the lesion was by no means so extensive. In the posterior columns a smaller rounded area of sclerosis was found on either side of the posterior median fissure, the lesion being more marked upon the left side and so situated as to involve the columns of Goll much more decidedly than the posterior root-zones.

Different levels of the cervical cord revealed essentially the same lesions.

*Dorsal Cord.*—The examination disclosed entire and pronounced sclerosis of the posterior columns of both sides. So decided was this lesion that the shape and bulk of the cord were materially modified, the latter being somewhat diminished. The lateral columns were much less affected than in the cervical cord though the lesion that did exist was most marked upon the left side, if not confined to it.

*Lumbar Cord.*—Here an area of pronounced sclerosis was found on either side of the anterior median fissure, while the left lateral column showed evidence of the same lesion,

though to a much smaller extent than in other portions of the cord.

Careful and detailed studies of the *sciatic nerves* yielded negative results. Nothing abnormal could be found in them.

#### CASE II.—MULTIPLE CEREBRO-SPINAL SCLEROSIS.

A man aged about 60 years, entered the Philadelphia Hospital (Jan. 31, 1884), complaining of progressive loss of power in all four extremities, with some stiffness and tremor. He stated that these symptoms had developed very slowly, and otherwise that his health was good. He denied that there was any loss of memory or mental failure, and under observation it was not made out that intellection had diminished. He did not suffer pain. The tremors were never present when the man was quiet but when any voluntary motion was attempted they commenced at once in the part moved and became very violent, spreading to all portions of the body and becoming so excessive as to arrest all action. He was suddenly seized with an apoplexy with ordinary symptoms and died without recovering consciousness.

#### AUTOPSY.

Right cerebral hemisphere and spinal cord alone examined. A large clot in external capsule between island of Reil and the corpus striatum. Microscopic sections were prepared of all portions of the neighbor-

hood, the corpus striatum and optic thalamus, also above these through the cortex. Scattered without discernible regularity of distribution through these regions were patches of various size of distinctly sclerosed tissue, with very marked multiplication of neuroglia : these patches had abrupt margins, but in the case of the larger sclerotic masses there were lying near the edge of the large patches more or less numerous small sclerosed spots. These foci of disease occurred in the white matter as well as in the cortex and in the ganglia. In the *spinal cord* the sclerosis existed in the whole length. In all the sections examined the central canal was obliterated and surrounded by densely packed neuroglial cells making a column of sclerotic tissue. Sclerotic patches of typical formation were found in various places in various sections : in one section the posterior fissure was entirely obliterated by a sclerosed patch into which the posterior columns were fused.

#### REMARKS.

These two cases of sclerosis are of interest from a diagnostic point of view. They confirm the opinion held by some neurologists that, in multiple spinal sclerosis, tremors do not exist, and that the most characteristic symptom of multiple cerebro-spinal sclerosis is loss of power, with tremors occurring only during movement.

The first case was believed during life to be, not a focal disease, but a lateral sclerosis, and we do not see, even in the light of the



autopsy, how the correct diagnosis could have been made. Indeed, the sclerosed patches were often so elongated in certain tracts that the case may be considered to be, as it were, half way between one of continuous disease of spinal nerve tracts and one purely focal.

### CASE III.—PSEUDO-MUSCULAR ATROPHY.

A. B. entered Dr. Wood's ward in the Philadelphia Hospital in a dying condition in October, 1884. No notes in regard to his chronic disease could be taken; but he was in 1880 a patient in the ward of Dr. C. K. Mills, to whom we are indebted for the following notes taken at that time:

“ Moderate drinker; chancres several times; buboes once in '57. In '76 first noticed a weakness of the little finger of right hand, with a tendency to drop. The weakness affected in succession the ring, middle and index fingers. In about a year he noticed that the left forearm became weak, and in a very short time he was unable to use it. Left forearm and arm wasted during the year, and at same time he began to have trouble in the neck, whose muscles wasted rapidly, and in about five months he was unable to hold his head constantly erect, it having a tendency to drop forward. Shortly after this the wasting attacked the right forearm and arm. He affirms that a year ago, while in jail, he lost the use of both legs, but they did not waste. Present condition: In order to keep his head up he is compelled to throw the weight of head back of the ordinary vertical position.

There is very great wasting of the following muscles: Splenius and complexus, trapezius, rhomboid, supra and infra spinati and serrati. The platysma-myoid and sterno-mastoid are wasted. The pectoral and latissima dorsi do not appear much wasted, but are flabby. Both arms hang perfectly helpless and flaccid. There is marked wasting in the deltoids, infra spinati, biceps and triceps, and all muscles of the forearm. The wasting is not marked in the hands, either because it is less or because of fatty change. The palms of hands look and feel fatty. There is marked loss of power in the flexors and extensors of both forearms, but he still has a very good grip. The right triceps extensor has some power. In grasping he uses considerable power of the interossei and the superficial and deep flexors. At both elbows he has a condition of recurvature, probably because of the atrophy, relaxation of ligaments and wasting of ends of the bones. The faradic contractility is retained, but in varying amount. Lately he has attacks of dyspnoea. Says he never had any soreness or fatigue pains in the wasted limbs, neck or head. No fibrillary tremors noticed during the examination."

#### AUTOPSY.

Only the portions of body relating to the pseudo-muscular atrophy examined.

*External Appearance.*—Muscles of back of neck, erector spinal muscles to lumbar region, deltoids, pectoral, trapezius, supra and infra

spinatus muscles, and biceps of both arms, apparently destroyed. Triceps humeri and sterno-cleido-mastoid muscles in part preserved; also all the muscles of legs. No *post mortem* rigidity in neck, shoulders or arms; moderately pronounced rigidity in forearms and legs. Right forearm, in circumference, 0.05 meters; arm, 0.05 meters; left forearm, 0.07 meters; arm, 0.06 meters. On opening the right arm the biceps was of a pale fawn color, but the triceps normal in color.

*Spinal Cord.*—On opening dura mater a slight amount of serous liquid ran out. Cervical cord: Membranes much thickened; itself very tough and gristly on section. Anterior cornua of gray matter illy developed, sunken in sections, and lacking color.

*Microscopical Examination.*—Transverse sections were made from the lower portion of the cervical enlargement of the cord. They present the following peculiarities:

In the anterior cornua of the grey matter there is a marked diminution in the number of nerve cells. Of the three groups of these cells, the anterior has almost entirely disappeared, the lateral group is represented by but a few individual cells, while the internal group seems to have undergone a less marked change. All of these cells, with the exception of a few in the internal group, appear shrunken and are evidently much diminished in size. They have lost in great part their polygonal shape, many of them being fusiform, and present but few processes. Only

in the internal group are these cells in any way approaching the normal type, and these are few and seen in only a few of the sections. They present the characteristic size and numerous processes of the typical motor cell, while they disclose a well-defined nucleus and nucleoli. In the atrophied cells the nuclei can only be distinguished with difficulty.

The neuroglia of the anterior cornua is increased in amount, the vessels appear shrunken, with thickened walls and large perivascular lymph spaces.

In the lumbar cord the cells in the anterior cornua appear normal; in this respect the lumbar cord is in marked contrast with the cervical.

*Anterior Nerve-roots of Cervical Cord.*—Transverse sections show that the anterior nerve roots have for the most part lost their normal contour, many of them presenting a markedly irregular and shrunken appearance. In some the nerve fibres are well preserved and present but a moderate amount of the connective tissue element. In others the nerve fibres are few and scattered, while a mass of connective tissue occupies the body of the strand. In many sections large areas are seen in which no nerve-fibres can be detected, and the connective tissue has the appearance of having undergone marked contraction to which, outside of the atrophy of nerve fibres, the shrunken appearance of the nerve roots is doubtless due.

*Nerves.*—The nerves examined were the



*median, ulnar and musculo-spiral*. Transverse sections showed that they had preserved their normal shapes. An extensive examination of many sections does not reveal any marked proliferation of connective tissue, nor do any of the nerve fibres show any decided signs of degeneration. Besides other reagents, osmic acid was employed with a uniformly negative result. It must be remembered, however, that the detection of a descending degeneration involving a limited number of fibres in a mixed nerve is a work of extreme difficulty, and that at best it could not be as well-marked as in the anterior nerve roots. Moreover, it may be stated that here and there areas exist in the sections in which the endoneurium seems to be more abundant than elsewhere, and that the nerve fibres lying in these areas are much smaller and have a much thinner medullary sheath than the fibres immediately adjacent. Though very suggestive, these changes are of such a character that they would readily escape the observer unless they were especially sought for, and perhaps they constitute all that we ought to expect.

*Muscles*.—The muscle selected for study was the *biceps*, it being atrophied to an extreme degree. Transverse sections measured only three-fourths of an inch in one direction and three-eighths in another. The muscular fibres were also all of them less than normal in diameter, but varied greatly from an approximation to normal, to one-fifth or even one-sixth this size.

Teased preparations demonstrate the pres-

ence of an abnormal amount of connective tissue. In many bundles it predominates largely over the muscular fibres, and in transverse sections it is seen to occupy not only the spaces between groups of bundles but also to surround here and there individual fibres.

The fibres themselves appear faintly granular and the transverse striations are not as distinct as in the normal tissue; or rather, the fibres vary from those in which the striations are well preserved to those in which no trace of striation can be detected. The muscle-nuclei are also unusually prominent and this would suggest an imperfectly developed or immature condition of the fibres. In addition, osmic acid demonstrates the presence of a large amount of fat. This exists both within and around the fibres and its amount is so great that in teased preparations it appears here and there in the shape of large drops.

No observations on the more intimate relations between the muscle and its nerves were successful. Several transverse sections, however, included a nerve-twig so small that it seemed out of all proportion to the mass of muscle it was evidently intended to supply. Transverse sections also showed that the blood-vessels, though perhaps sufficiently numerous, were small and shrunken and appeared to have thickened walls.

*Superior Cervical Ganglion of the Sympathetic.*—Transverse sections when contrasted with similar sections from a normal specimen,

appear to show a marked increase in the amount of connective tissue ; at the same time the nerve-cells, though perhaps not decreased in number, appear more granular and their outlines and contents are less clearly defined. It is doubtful, however, whether we can attribute to these facts a special significance ; at any rate repeated confirmation would be required to obtain a definite result. It might also be suggested that a study of the rami communicantes would be as important as a study of the ganglia.

#### LOCO-MOTOR ATAXIA.

Of this disease we have studied the cord in three cases. The first of these is of great diagnostic interest.

CASE IV.—Mr. —, aged 50. About 1866 or '67 Mr. — was forced to ride all night unexpectedly and without proper protection some fifty miles over a very high mountainous country, and became completely benumbed by the excessive cold. He was seized a few hours after this exposure with a violent pain which was diagnosticated as due to acute sciatica. He has suffered at irregular intervals ever since from attacks, which he stated to be similar in character to the first; the attacks becoming gradually more frequent and more severe until they have become almost incessant. During all these years he had been supposed to have rheumatism but received no benefit from anti-rheumatic treatment. He also affirmed that at no time had any joint been affected. He was first seen by Dr.

Wood in the spring of 1884. At that time it was noted that the pains were described as very severe, shooting and burning in character, without soreness except momentarily after the pain. These occurred in both legs, were not attended with any stiffness or pain on movement, nor swelling of the joints. There was no loss of sensation that could be detected by the æsthesiometer, and no paralysis of any sort. The patella reflexes were entirely absent. Coördination appeared to be perfect. Mr. — had been an active sportsman and his muscular powers seemed in every way to be unabated. At the time Dr. Wood was called in he was suffering from brain symptoms which rapidly developed into a cortical cerebritis of which he died. Under the circumstances no aid in the diagnosis could be derived from the state of the pupils ; but a positive opinion was given that the patient had long suffered from posterior spinal sclerosis, the opinion being based upon the bilateral and other characters of the pain, the persistent absence of soreness, stiffness or pain on motion, the obstinacy of the disorder, and the absence of the patella reflexes.

The *autopsy* was obtained with much difficulty and only three days after death ; the body having been part of this time on ice. The cord was very carefully manipulated but revealed so much of post-mortem change that it was only possible to be thoroughly seen that the posterior columns were sclerosed in the lumbar region with complete obliteration of the posterior fissure. The exact relations of



the sclerosis to the posterior nerve roots could not be made out : but it was plain that the process was most intense in the portions of the posterior column farthest from the root-zone.

CASE V.—The second case died in the University Hospital of intercurrent disease whilst suffering from loco-motor ataxia. The notes show the presence of the typical symptoms of loco-motor ataxia, except that during his stay in the hospital the patient had no pains and *positively asserted that he never had had such pains.*

The following are the notes taken at the microscopical examination of the cord :

*Cervical Cord.*—Well developed sclerosis in the columns of Goll. The posterior fissure in some places is obliterated and the maximum changes are in the edges of the fissure. Between the free edges of the fissure are very numerous embryonic cells. The disease seems to have commenced in the parts immediately proximate to the fissure. There is also some multiplication of neuroglia cells in the immediate neighborhood of the spinal canal.

*Dorsal Cord.*—A wedge-shaped mass of densely sclerosed tissue occupies the portions of the posterior columns on each side of the posterior fissure, which is almost entirely obliterated, reaching about half way to the nerve roots ; between it and the region of the nerve roots there is an increase of neuroglia elements, but the axis cylinders are mostly preserved. The line between the sclerosed and

non-sclerosed tissue, mostly sharp. Pia-mater strongly inflamed over the region of the posterior fissure.

*Lumbar Cord.*—A distinct wedge-shaped mass of sclerosed tissue occupies the columns of Goll as in the dorsal cord. It is composed entirely of a very dense trabecular tissue, with scattered vacuoles as seen in section. This mass is separated by a pronounced line from the neighboring parts. Between it, however, and the posterior nerve roots the structure is more dense than normal, but still with numerous nerve fibres existing with intact medullary sheaths, probably about one-third of the nerve fibres are atrophied; beyond the nerve roots the tissue is normal.

CASE VI.—Dr. B., aged 50, physician and reputed abortionist. The patient walked into the clinic with a markedly ataxic gait, swayed when the eyes were closed and presented entire loss of the patella reflex. He appeared much older than he really was, spoke indistinctly, was slow of comprehension and presented decided symptoms of mental impairment.

It was exceedingly difficult to obtain a history from him, but after much trouble the following was elicited: He had been tolerably healthy all his life, but had been unsteady in his walk for several years. Remembers having had for a long time terrible pains in the back of his thighs, but does not remember having had any feeling of constriction about the trunk. He never saw double. Acknowledged gonorrhœa but denied syphilis.

On examining the case more closely the legs were found to be extremely ataxic, while the arms presented the same symptoms to a less degree. His depressed mental condition made it impossible to make a satisfactory study of the sensory phenomena. There were no eye-symptoms.

Taking the case as a whole, it presented nothing distinguishing it from an ordinary loco-motor ataxia, with the exception of the mental condition and a remarkable deformity of the feet. The man was flat-footed to an extreme degree, while large hard prominences existed over the instep. He could give no intelligent account of these lesions, saying simply that the trouble had come on suddenly, that he had hurt himself—had “broken his feet”—but could not tell when or how. He had never had any pain in them.

After remaining in the ward for several weeks, during which a progressive loss of strength made him bed-fast, a large sloughing ulcer of the buttock made its appearance and he died of exhaustion, or possibly septicæmia.

At the post mortem, in addition to other lesions about to be described, a large gumma of the liver was discovered, proving that the patient's statements in regard to syphilis had been incorrect.

The general form and outline of the feet corresponded very closely with the description and figures given Prof. Charcot and J. M. Féré (*Archives de Neurologie*, VI. 306; also, another case, *Revue de Méd.*, 1884, p. 473)

of the so-called *Pied tabétique*. They presented the following peculiarities: The arch of the foot was entirely lost, so as to bring the plantar surface continuously to the ground from the heel to the toes. The change had been accompanied by an increase in thickness over the tarso-metatarsal articulation, so that, although the foot rested flat upon the ground, this region was very prominent. The prominence was most marked on the inner edge.



The deformity was greatest in the left foot, which being a unique specimen was preserved intact, while the right foot was dissected sufficiently to reveal the nature of the lesion.

The ankle-joint, which was the first examined, exhibited no enlargement, nor did the articulating surfaces of the tibia and fibula yield any evidences of disease. The articulating surfaces of the astragalus, however, were here and there denuded of cartilage and much roughened. Similar changes, though slight, were noticed in the calcaneum, but it was in and about the joint formed



by the internal cuneiform and first metatarsal bones that the greatest amount of change had occurred. The cartilage had entirely disappeared from its upper portion. Here the two bones had become firmly united. The microscope revealed a continuous osseous structure from one to the other. The lower portion of the joint, which was equivalent to about three-fourths of its entire area, was simply filled by continuous or adherent surfaces of cartilage, while here and there a narrow chink, representing the original cavity of the joint, was left. The bones appeared enlarged and distorted, and an examination of their internal structure showed that the cancellated tissue had been replaced here and there by small masses of dense ossific deposit.

The middle cuneiform and second metatarsal bones were partly crowded over the internal unciform and first metatarsal bones, and presented lesions similar to those just described. The heads of the two metatarsal bones had in one place become continuous, and one section revealed an isthmus of bone uniting an angle of the internal cuneiform with the head of the second metatarsal.

The general impression given by the study of these lesions was that of a mass of bones which, being at one time softened, had been mechanically distorted and displaced. The absorption or deposition of bony tissue appeared to follow no rule, nor did the destruction of the cartilage distinguish itself by any peculiarity other than that it seemed to precede the changes in the bones.

*Lumbar Cord.*—Central canal completely filled by a mass of connective tissue cells which also abounded in the neighboring tissue. Anterior fissure marked, but at its edges very distinctly sclerosed, with an abundance of nuclei and very few, if any, tubules in the tissue immediately near the margins. Antero-lateral columns showed great excess of connective tissue, very numerous nuclei and much fewer than normal normal nerve tubules. Posterior columns and root zones densely sclerotic with complete obliteration of nerve tubules and of the posterior fissure; the whole making a wedge-shaped mass showing, in the less affected tissue. Grey matter with more connective tissue, nuclei, and denser neuroglia than normal. Nerve cells normal.

*Dorsal cord* as lumbar, except that the antero-lateral columns were much less affected.

*Cervical cord.*—Central canal and posterior fissure obliterated, and the posterior tracts sclerosed as in the other portions of the cord; but the changes in the antero-lateral columns less marked than in the dorsal region.

#### CASE VII.—ACUTE ASCENDING OR LANDEY'S PARALYSIS.

A. K., aged 38, Brewer. The patient, a large robust-looking man, had had no illness of moment up to the present attack. He had acknowledged having had a chancre at the age of eighteen, and had long been accustomed to drink daily enormous quantities of beer. When first examined, February 14, 1884, he complained of numbness in both

legs but walked about and ascended a stairway without apparent difficulty. He called attention especially to a small, deep and sharp-cut ulcer on the plantar surface of the great toe of the right foot. Though deep it did not penetrate to the bone.

On February 17th, three days later, he was again visited in response to a hasty summons. He had on that day been unable to leave his bed. A careful examination now revealed decided paresis of the muscles of the legs, and an area of marked anæsthesia on the inner aspects of the calves. The two limbs appeared to be affected equally. Two days later, complete paralysis of the legs and thighs and some paresis of the hands were noted. In the course of a week the disease had progressed so far as to involve all four extremities alike. The muscles of the trunk were then attacked in turn. The patient, when raised or pulled into a sitting posture, collapsed into a flaccid, helpless mass. Breathing was at this time much interfered with, being labored and almost solely diaphragmatic.

There was now a temporary lull in the advance of the symptoms which continued until the last day of February. He then partially lost control of the muscles of the neck, and on the first of March had decided difficulty in swallowing. This continued for several days. Signs of alienation also made their appearance, the patient believing himself to be a cavalry officer on parade.

He continued in this critical condition until the fourth of March. The difficulty in swal-

lowing was then no longer noticeable and the control over the muscles of the neck seemed to have been regained. He now remained for the period of a week without other change than a commencing return of power in the muscles of the trunk, and he no longer fell into a heap when raised into a sitting position. The return of power in the arms and legs was gradual in the extreme. On the 27th of March, when circumstances required his removal to the hospital, though he had regained almost complete control of the muscles of the trunk, his arms had progressed only so far on the road of recovery as to enable him to hold a glass by pressing the two hands together. The grip was still absent. He had also regained partial control over the muscles of the thighs.

At the hospital, his recovery though slow, seemed assured. At the end of six weeks he had so far regained the power of his hands and feet as to enable him to partially dress himself and to walk a distance of ten or twelve feet. His appetite was fair and he was able to feed himself. Although much emaciated his prospects seemed most promising, when he suddenly developed a rapid and enormous pleural effusion. This accident, due probably to some trivial exposure in his weakened condition, was relieved by paracentesis but promptly recurred and although relieved a second time, the patient succumbed.

In this interesting history, the significance of the ulcer on the great toe is rendered doubtful by the fact of its ante-dating, by four



or five days, all signs of paralysis. However, as soon as the patient presented symptoms of improvement, the ulcer began to heal and by the second week of March had, with the exception of a small scar, entirely disappeared. At various times small hæmorrhagic exudations were observed under the plantar epidermis, but they were never very large nor extensive.

Regarding the original or exciting cause of the disease, inquiry disclosed the fact that the patient had been exposed to a cold drenching rain for an entire day about a week preceding his illness. His specific history must also be borne in mind, as well as the fact of his daily consumption of enormous quantities of beer.

His treatment consisted in the early period of his disease in active counter-irritation and large doses of iodide of potassium and ergot. These drugs he bore remarkably well. Later on, he was placed on nitrate of silver.

It is worthy of remark that beyond a temperature of  $100.5^{\circ}$  observed during the first week, no notable rise of temperature occurred.

On account of the objections raised by the friends to an autopsy, only the dorsal and lumbar cords were obtained for study; the following is the detailed results of the microscopic examination:

*Lumbar Cord.*—The posterior fissure in all the sections is either entirely obliterated, or else is coherent in its exterior portions, and interruptedly joined within so as to leave closed spaces with much thickened edges. In

the *posterior columns*, near the grey matter, the tubules are abundant, but very much reduced in size, the change especially affecting the myeline which is wasted; the whole tissue near the centre of the cord appears abnormally dense and opaque, and is indeed more dense than in the peripheral portions; as the circumference of the cord is approached, the tubules loose their myeline and are reduced to simple axis cylinders, the latter themselves also being smaller than normal; finally the axis cylinders grow smaller and smaller, until they fade out entirely.

The *lateral columns* reveal changes similar to those just detailed, but less pronounced. The *anterior columns* seemed to be the least affected; the anterior fissure is everywhere free and open.

The grey matter is more dense and opaque than normal. Some of the motor cells are in portions of them slightly yellowish, but most of them simply seem a little more granular than normal; there is an enormous multiplication of cells of the ependyma nearly blocking up the central canal.

In all parts of the cord the neuroglia seems more granular than normal.

*Dorsal Cord.*—The posterior fissure is coherent in its peripheral portion; the tubules in the immediate neighborhood of the fissure are all gone: following round the periphery of the cord until the region of the lateral columns is entered, no tubules are apparent, except a very few remarkably small ones near the root zones. About one-third of the dis-

tance towards the centre, the posterior fissure becomes disconnected, with its edges thick and sclerosed. As the field is turned away from the fissure towards the lateral columns, the nerve tubules become more apparent, until the nerve roots are reached. Incipient similar changes are apparent, but not nearly so marked, in other portions of the white matter of the cord. The motor cells of the grey matter are normal in appearance.

#### REMARKS.

The changes in this cord were in some of their appearances similar to those of a secondary degeneration. There was, however, no starting point for such degeneration, and these changes were not confined to regions of the cord which would be naturally reached by such degeneration. Unfortunately the nerves and their roots were not examined at all, but the condition of the cord is of great interest in connection with the observation of Déjerine of an apparently similar change in the nerves. We cannot think that there is any probability of these changes being secondary to alterations in the large ganglionic cells of the cord. Neither Déjerine nor ourselves were able to detect any change in the contour or appearance of the cells; and it does not seem philosophical to assume such change, especially as, at least in our case, regions of the nervous system not believed to be under the trophic influence of these ganglionic cells were affected.

CASE VIII.—GENERAL MYELITIS SUPERVENING UPON A SUB-ACUTE MYELITIS OF SPECIFIC TYPE.

H. S. entered the wards of the University Hospital, Nov. 11, 1884. The following history and notes upon the case are extracted from the Hospital case book:

The patient's statement is as follows: "He had a chancre in February, 1883, and in December of the same year, began to suffer from nervous symptoms; the only secondaries having been some sores in the calves of the legs. During the day of September 8th, 1883, he felt a little weakness in his legs, but went to bed believing that he was entirely well. When he awoke in the morning he was almost unable to walk. He got a few steps from his bed and could go no further. He was then taken to some hospital, where he very rapidly passed into the condition that he is in at present. He affirms that he has at no time suffered from headache or mental disturbances."

*Present Condition.*—Lying in bed, he cannot raise his legs from off the bed, although he can lift his knees somewhat. The legs are well nourished, the muscles large and firm, and their temperature good. He is able to move all the muscles slightly; he complains much of pain in the legs, which came on, he states, soon after the palsy. These pains are both aching and darting. Both the legs are very rigid, the left leg slightly worse than the right; the patella reflex is markedly exaggerated, but there is no ankle clonus, and the

cremaster reflex is feeble. There are very marked muscular tremors in the quadriceps femoris of the left leg. At night he suffers much from jerkings, and violent quick movements of the legs. The electric contractility of the muscles of the legs is beyond normal. He lies with his legs rigidly adducted, but the feet are not crossed. When tested with the æsthesiometer, he can feel the single point pushed forcibly against the skin of the leg, but is unable to separate the points at any distance whatever. The arms are slightly rigid; there is also marked failure of the power of the left arm. Very distinct pain is caused by moving the legs or arms. The pupils are at times unequal, but respond to light or pinching the neck. At times when excited, he seems to lose control over the organs of speech, makes faces, and appears indeed to have a sort of facial spasm. An ophthalmic examination fails to show any alteration of the nerve indicative of central disease. The belly is tympanitic. He has some little control over his bladder, but none over his bowels.

Ordered anti-specific treatment :

*Dec. 12th.*—No improvement in patient; evident failure of general systemic powers, and the legs are distinctly wasting and his power over them less,

*Dec. 14th.*—Man seized with vomiting and hiccough.

*Dec. 16th.*—Patient evidently very rapidly failing; still has hiccoughs at intervals. The patella reflex is easily excited, indeed is



abnormally active, but there is no power in the muscles, and the reflex is soon exhausted on repetition of the tapping.

Died Dec. 17th, of exhaustion.

#### AUTOPSY.

About ten hours after death; owing to the violent opposition of patient's friends, the dorsal and lumbar portions of the cord alone could be obtained. On microscopical examination both dorsal and lumbar regions were found to be in the same condition. The white and gray tracts were, in all parts, almost equally affected. The nerve tubules were entirely gone and no trace of any of them to be seen. The large ganglionic cells were for the most part absent, and only two or three perfect ones were found in a careful search through several sections. A large proportion of the few still at all existent were shrunken, with the processes more or less gone, and usually had no distinct nucleus. Everywhere through the cord there were immense numbers of large roundish neuroglia cells. The fissures, especially the posterior, were more or less completely obliterated. The central canal was entirely choked up with cells.



